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United States Department of Agriculture,

DIVISION OF VEGETABLE PHYSIOLOGY AND PATHOLOGY.

DANGER OF INTRODUCING A CENTRAL AMERICAN COFFEE DISEASE
INTO HAWAII.

The interest evident in Hawaii in the introduction of Guatemalan coffee for cultivation calls for a word of caution as to the danger of introducing a very destructive disease of the coffee plant prevalent in Mexico, Central America, and South America. Cooke¹ described two small parasitic fungi, *Stilbum flavidum* and *Sphaerella coffeicola*, growing on coffee leaves sent him from Venezuela, and believes them to be the cause of the disease known as Mancha de hierro or Candelillo, which attacks the leaves of the coffee plant in that country. In 1892 Prof. Nicolas Saenz², of the National University of Colombia, published a pamphlet on coffee culture and in it described at some length the disease in question. He speaks of it as a "disastrous malady, which has caused and is now causing great loss to growers." The affected plants, he says, present a number of round or oval dingy yellow spots on the branches, fruits, and especially on the foliage, he having counted as many as seventy of these spots on a single leaf.

EFFECTS OF THE DISEASE.

The plants in good soil show but little change at first and may pass through the winter and the dry, hot season almost unchanged, but when the first rains come on even the most vigorous suffer greatly, losing most of their leaves and fruit, so that the harvest is therefore much reduced. Not all the diseased leaves fall, however. Sometimes in case of mild attacks the spots fall away, leaving holes in the leaf. Spots on the berries always appear on the upper side, and the berries that do not fall frequently show a portion of the pericarp dead and simply a network of dead fibrous tissue. "Sometimes the diseased part extends as far as the seeds, which then are retarded in their development, as is shown by their wrinkled surface." Even strong trees require at least three years to recover from an attack of the Mancha.

¹ Cooke, M. C., The coffee disease in South America (Journal of the Linnean Soc. Bot., Vol. XVIII, pp. 361-467, Pl. VIII.

² Saenz, Nicolas, Memoria sobre el cultivo del Cafeto, Bogota, 1892, pp. 67.

The disease almost invariably begins in the upper or colder part of a plantation. Professor Saenz further states that "the development of the disease is favored by long rainy seasons, accompanied by a relatively low temperature;" and again, that "in order to start a coffee plantation where there is least risk of its suffering the ravages of the Mancha a locality should be selected whose temperature is 23 degrees C. or above, because it is observed that at the lower temperatures the fungus develops rapidly."

THE DISEASE IN COSTA RICA AND GUATEMALA.

In 1893 Sr. Adolfo Tonduz,¹ of the Costa Rica National Physico-Geographical Institute, made a preliminary report on the Mancha, and with this report sent out dried leaves showing the disease. He found in Costa Rica that it caused the dropping of great numbers of the berries from some trees.

In 1897 W. J. Forsyth² wrote two short accounts of this malady (determined by Mr. J. B. Ellis from specimens sent to the Smithsonian Institution in 1894) as it exists in northwestern Guatemala (Tumbador District) and southwestern Mexico (Soconusco in Chiapas). He says:

When I first went to Guatemala—March, 1883—the coffee showed a magnificence and a luxuriance of growth and redundancy of foliage that I had hitherto been a stranger to. From 8 to 12 pounds of coffee was not unfrequently picked off single trees. But in the early nineties I noticed a great change, particularly in Soconusco and the district in Guatemala called Tumbador, which immediately adjoins Soconusco. The coffee trees seemed to have lost their great and exuberant vigor. Their luxuriant foliage was decidedly lessened, and in their stead an unhealthy, sickly appearance had taken its place. The leaves were more scattered on the ground than in their proper place on the trees. The young wood especially appeared weak and was withered and black looking from the ends leading toward the trunk.

In recent letters to this Division and to the Division of Entomology Mr. E. P. Dieseldorff, a prominent coffee planter of Coban, Central Guatemala, expressed alarm at the extension of this disease about Coban. In a letter dated December 16, 1897, he writes: "I am no longer afraid of the scales, but more seriously of the coffee-leaf disease, which has increased alarmingly and is doing damage to many plantations—about \$100,000 worth every year;" and again, "I find that lately the coffee-leaf disease has increased alarmingly, so crops of many estates have greatly decreased." On January 3, 1898, he wrote: "Having been saved from *Dactylopius*, the coffee plantations in the north of Coban are now seriously threatened by the coffee-leaf disease, called Candelillo, or Viruela, and I am very much troubled

¹ Tonduz, Adolfo, Informe sobre la enfermedad del Cafeto, Instituto Físico-Geográfico-Nacional, Servicio Botánico, 1893, San José de Costa Rica, C. A., pp. 28, with dried specimens of diseased leaves.

² Forsyth, W. J., King coffee, a new coffee-leaf disease developed in Soconusco Chiapas, Mexico (New Iberia Enterprise, Nov. 21, 1896; reprinted in the Tropical Agriculturist, Vol. XVI, Feb. 1, 1897, pp. 549, 550). Coffee planting in Mexico; coffee-leaf disease in the State of Chiapas, Mexico (Tropical Agriculturist, Vol. XVI, March, 1897, pp. 629-631).

by it. I noticed its appearance some eight years ago, and since then it has assumed alarming proportions." He concludes by saying: "I believe the best would be to start planting tea, which has been taken up by Ceylon planters when coffee failed there on account of similar reasons." Samples of the diseased leaves received from Mr. Dieseldorff have shown the disease to be identical with that studied by Tonduz in Costa Rica and Saenz in Colombia.

The leaves attacked by this Mancha or Candelillo disease show dead, yellowish gray spots, from one-eighth to three-eighths of an inch in diameter, on both sides. On the upper side slender threads rise, each from one-fiftieth to one twenty-sixth of an inch in length, bearing on the upper end a little globose head of spores. This is the fungus called *Stilbum flavidum* Cke., and is, as the name denotes, a clear yellow.

SPECIAL DANGER TO HAWAII.

In the *Hawaiian Planter's Monthly*, 1897, there appears the following item:

"A fine specimen of coffee grown from Guatemala seed was received at this office," says the *Hilo Tribune*, "from Mr. J. M. Horner's plantation at Kukaiau, from a four-year-old tree, which had upon the one primary received nearly nine hundred well-developed coffee cherries, and there were forty such primaries on the same tree—fully three-quarters of a pound to the primary. Some of these primaries, Mr. Horner informs us, had one thousand cherries. He says he will have twenty-five tons of coffee this year, and were all his trees from Guatemala seed he would have sixty tons from his plantation instead of thirty. This is the way he replies to the difference and selection of seed. Side by side the Guatemala and wild coffee trees are growing, and the former produce eight times the amount of the latter. The growth of the wood is in favor of Guatemala by long odds."

The writer has been informed that considerable coffee seed has been imported into Hawaii from Guatemala in the past, and that some young plants have been brought in.

It is obvious that such reports as that published in the *Hawaiian Planter's Monthly* and elsewhere regarding the superiority of Guatemalan over Hawaiian coffee is likely to lead to a considerable importation of seed and possibly of young plants into Hawaii from Guatemala, and in this way the Mancha disease may be introduced.

Hawaiian weather records for 1894 and 1895 give the rainfall in many parts of the Island of Hawaii near where coffee is grown as very heavy—from 150 to 200 inches or more annually. The temperature records are reported for three points near the coffee plantations, and at all three the mean temperature for every month in the year is below 75 degrees. This is the temperature below which the disease is said by Professor Saenz to spread rapidly.

NECESSITY OF INSPECTION.

Now, in view of Professor Saenz's statements as to the disease being favored by rainy weather and by temperatures below 75 degrees F., there is grave danger of its spreading and doing damage if intro-

duced into the islands, while from Forsyth's and Dieseldorff's statements it appears that it exists in at least two regions of Guatemala.

The safest course would be to prohibit the importation into Hawaii of all seeds or young plants from South America, Central America, and Mexico. Should this be impracticable it would certainly be advisable to have all plants and seeds imported rigidly examined by an expert, who would have power to destroy those affected. At the same time it would be well to guard against the introduction of the other coffee-leaf disease, called *Hemileia vastatrix*, which has brought about the almost total destruction or abandonment of the coffee plantations of Ceylon, causing the production to decline from 1,000,000 cwt. eighteen to twenty years ago to 50,000 cwt. in 1896, and in southern India causing it to decline from 450,000 cwt. to 240,000 cwt. This disease, the worst enemy of coffee culture known, is very difficult and in many cases impossible to remedy. It exists in many places in southern Asia, in Ceylon, Sumatra, Java, the Fiji Islands, the Islands of Reunion, and in east Africa. All importations from these points of plants or seeds of coffee or of other plants of related genera, particularly the cape jasmines, or gardenias, and vanguardias, is in the highest degree dangerous and should be prohibited.

A disease caused by a nematode worm (*Meloidogyne exigua* Göldi) does very great damage to the coffee in Brazil and might well be guarded against also.

THE MANCHA AND THE COFFEE MARKET.

Because of the Hemileia disease Mr. J. Ferguson, editor of the *Tropical Agriculturist and Ceylon Observer*, says: "It will be a long time, however, before such an enterprise or any other enterprise at present within British territory, can seriously affect the coffee market, and I see no early prospect in any other quarter of an over-production of coffee." At that time Mr. Ferguson probably had no cognizance of the serious diseases above described, which threaten the coffee industry of Central America and Mexico. Indeed he cites these very countries as having from their constantly increasing production kept the markets supplied while the production was declining in the East Indies.

It is then probable that the coffee industry of Hawaii will be greatly developed in the future, provided these almost irremediable diseases and pests are prevented from reaching the islands.

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Approved:

JAMES WILSON, *Secretary.*

WASHINGTON, D. C., July 26, 1898.